[002] This application claims priority from German Application Serial No. 103 02 506.5 filed January 23, 2003.

[003] FIELD OF THE INVENTION

[004] The invention concerns an electromagnetically actuated dual clutch-brake combination ~~according to the preamble of the principal claim~~.

[005] BACKGROUND OF THE INVENTION

[011] This objective is achieved by an electromagnetically actuated dual clutch-brake combination ~~also having the features of the characterizing portion of the principal claim~~.

[012] ~~Advantageous design features of the invention are described in the subordinate claims.~~

[013] SUMMARY OF THE INVENTION

[021] BRIEF DESCRIPTION OF THE DRAWINGS

[022] The invention will now be ~~explained in more detail~~ described, by way of example, with reference to the ~~attached figures~~, accompanying drawings in which ~~show~~:

[025] DETAILED DESCRIPTION OF THE INVENTION

[026] Fig. 1 shows a drive input shaft 2 of a dual clutch-brake combination 8, a first drive output shaft 4, and a second drive output shaft 6. The input shaft 2 is engaged with the drive output shaft 10 of an electric motor (not shown), which is held in rotationally fixed connection by a keyway joint 12. The drive shaft 2 and the two drive output shafts 4, 6 are axially fixed by bearings 14, 16, but mounted so that they can rotate in a two-part housing 18, 20 of the dual clutch-brake combination 8. On the first drive output shaft 4 is arranged a flange ~~20~~ 21, which has at its outer circumference a shoulder 22 whose end face forms a friction surface 24, which is provided in order to cooperate with an opposing

friction surface 26 of the clutch armature 28. The clutch armature 28 is connected to a flange 30 of the drive input shaft 2 by an annular disk spring (not shown), rotationally fixed but able to move axially. In the shift position (shown in Fig. 1), a magnetic coil 32 of the clutch is energized with current. Accordingly, the armature moves so that the magnetic circuit establishes contact between the friction surfaces 24, 26 of the flange ~~20~~ 21 and the clutch armature 28. Thus, when the magnetic coil of the clutch is switched on, the clutch armature 28 is pressed against the flange ~~20~~ 21 so that by virtue of the friction surfaces 24, 26 a torque is exerted by the clutch armature 28 connected to the drive input shaft 2 on the flange ~~20~~ 21 connected to the first drive output shaft 4. On its side facing towards the magnetic coil of the clutch, the clutch armature 28 has a hollow cylindrical section which encloses the outer circumference of the magnetic coil 32 of the clutch with a small radial clearance. When the magnetic coil 32 of the clutch is switched off, the armature is moved by an annular disk spring 34 (shown in Fig. 2) toward the right as seen in Fig. 2, into its second shift position, and held there. In this shift position, the friction surfaces 24 and 26 of the flange 20 and the clutch armature 28 are axially separated, so no torque is transferred between the drive input shaft and the first drive output shaft. However, in this second shift position, inner gear teeth 36 present in a hollow cylindrical area 38 of the clutch armature 28 are engaged with drive gear teeth 40 formed on the outer circumference of a flange 42 connected to the second drive output shaft 6. The flange 42 connected to the second drive output shaft 6 is axially stepped, such that the drive gear teeth 40 are formed on a radially outer step 44 and an annular disk spring 48 is attached to a radially inner step 46, which connects a brake armature 50 of an electromagnetic brake 52 rotationally fast, but axially movably to the second drive output shaft 6. The brake armature 50 is attracted by a magnet element 54 of the electromagnetic brake 52 when a brake magnet coil 56 is energized with current. The electromagnetic brake 52 can be actuated independently of the electromagnetic clutch, so that all four shift conditions can be implemented. In particular, it is possible, first, when the clutch magnet coil 32 is switched off, to impose a given torque on the second drive output shaft 6 by means of the input electric motor, which determines the torque transmission in the variable

longitudinal differential lock of a distributor gearbox of a vehicle. If the electromagnetic brake 52 is now switched on, this torque is still applied statically to the second drive output shaft 6 even when the clutch magnet coil ~~30~~ 32 is energized with current and the connection between the clutch armature 28 and the second output shaft 6 is disengaged. The electric motor can then be used to activate the first drive output shaft 4, by which the range shift between a slow-drive range and a fast-drive range is brought about.

[027] The second drive output shaft 6 is constructed as one piece with the stepped flange 42 and has along its rotation axis a through-going hollow space through which the first drive output shaft 4 passes. The flange ~~20~~ 21 has a widened hub adjacent to the radially inner step 46 of the stepped flange 42 and a small axial distance from it. Thus, at least in part, the ~~hub 20~~ flange 21 occupies the same axial structural space as the radially outer step 44 of the stepped flange 42. This saves axial structural space. The first output shaft 4 extends axially beyond the area of the flange ~~20~~ 21 into a hollow cylindrical area 58 of the drive input shaft 2. The first output shaft 4 is mounted in the input shaft 2 by means of a bearing 60 and in the second output shaft 6 by means of bearings 62, 64.

Reference numerals

2 drive input shaft
4 first drive output shaft
6 second drive output shaft
8 dual clutch-brake combination
10 engine shaft
12 keyway connection
14 bearing
16 bearing
18 housing component
20 housing component
21 flange
22 collar
24 friction surface
26 friction surface
28 clutch armature
30 flange
32 clutch magnet coil
34 annular disk spring
36 inner gear teeth
38 hollow cylindrical area
40 drive gear teeth
42 flange
44 area
46 area
48 annular disk spring
50 brake armature
52 electromagnetic brake
54 magnet element
56 magnet coil
58 area
60 bearing
62 bearing
64 bearing